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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of **Dharap**
Serial No.: **09/374,694**
Filed: **08/16/99**
Atty. Docket No.: **PHA 23-737**
Group Art Unit: **2751**
Examiner: **K. Verbrugge**
Title: **SEMANTIC-BASED CACHING POLICY TO MINIMIZE LATENCY**

APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

This is an appeal from the decision of the Examiner dated 3 May 2002, finally rejecting claims 1-20 of the subject application.

I. REAL PARTY IN INTEREST

The above-identified application is assigned, in its entirety, to Philips Electronics North America Corporation, a company organized under the laws of the State of Delaware.

II. RELATED APPEALS AND INTERFERENCES

Appellant is not aware of any co-pending appeal or interference which will directly affect or be directly affected by or have any bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-20 are pending in the application. Claims 1-20 stand rejected by the Examiner under 35 U.S.C. 102(a), claims 1-5, 7, 8, 10, and 12-17 stand rejected by the Examiner under 35 U.S.C. 102(e), claims 6,9, 11, and 18-20 stand rejected by the Examiner under 35 U.S.C. 103(a).

IV. STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection in the Office Action dated 3 May 2002.

V. SUMMARY OF THE INVENTION

The invention comprises a caching system and method wherein the caching strategy is based on the semantic type of the information being cached. When a resource is retrieved from a remote source, such as from a server via the Internet, the resource is characterized by its semantic type. The caching system stores the retrieved resource for subsequent retrieval based on its semantic type, using different caching policies for different semantic types. (Applicant's page 3, lines 5-8).

As is known in the art, caching strategies involve a tradeoff between the speed of information access and the risk of retrieving "stale" or "outdated" information. The information is initially received from a remote source, and stored in a cache memory for potential subsequent retrieval. If the information is subsequently requested, the information can be provided from the cache memory, rather than incurring the delay caused by retrieving the information from the remote source again. If the information at the source changes frequently, however, the information that is provided from the cache memory is likely to no longer correspond to the source information. Conventional caching strategies are structured to choose whether to retrieve the information from the source or from the cache memory, based on the estimated volatility of the information. If it is assumed that the information rarely changes, the information is rarely updated from the source, thereby allowing for maximum speed of information access. If it is assumed that the information changes frequently, only very closely occurring accesses to the information will realize the speed advantages provided by the cache.

In a preferred embodiment of this invention, the cache memory is partitioned into separate caches, ranging from "active cache" to "static cache". The rules associated with the active cache are structured to avoid access to "stale" information, while the rules associated with the static cache are structured to provide maximum access speed. The rules associated with the intermediate caches are structured to provide a gradual transition from the active to static strategies. (Applicant's page 5, lines 1-10.) The cache system of

this invention determines which cache to place a retrieved resource (information item) into a select cache, based on the determination of the semantic type of the resource.

As explicitly defined by the Applicant, semantic type "refers to different connotative meanings that the information contents of resources can have, as perceived by the user" (Applicant's page 3, lines 9-10). Of particular note is the fact that the semantic type is based on the user's perception. That is, the same information may be perceived differently by different users of the information. Stock prices, for example, change rapidly, and, if cached at all, would conventionally be cached using a strategy that avoids stale information. In accordance with this invention, however, the classification of the information, and thereby the determination of which cache to place the information, is based on a user's perception of the information content of the resource. A stock broker, for example, would consider it important to have an up-to-the-minute list of stock prices, and would characterize this information so that it is cached in the aforementioned 'active' cache. On the other hand, a person who views his portfolio once a week would not be concerned if the cache contained information that was minutes-old, or even hours-old, and would characterize this same information such that it is cached in the 'static' cache.

In a preferred embodiment, each resource is preferably categorized using a default semantic type. The user may explicitly change the semantic type, or the mapping between semantic types and cache types, or, a semantic-type-determinator may change the semantic type or the mapping, based, for example, on the user's history of accessing similar resources, or on a profiling of the user's interaction with this resource. (Applicant's page 3, lines 25-28.)

Also included in a preferred embodiment of this invention is a strategy for moving information from one cache to another, as the user's perception of the information content changes with time. The aforementioned list of stock prices, for example, may initially be cached in the active cache, then moved to the static cache at the time of close of the stock market. Other resources may progress, or "percolate" through the caches at a more gradual pace. (Applicant's page 8, lines 2-13.)

VI. ISSUES

Are claims 1-20 patentable under 35 U.S.C. 102(a) in view of the Applicant's admitted prior art?

Are claims 1-5, 7, 8, 10, and 12-17 patentable under 35 U.S.C. 102(e) in view of Rubin et al. (USP 6,061,763, hereinafter Rubin)?

Are claims 6, 9, 11, and 18-20 patentable under 35 U.S.C. 103(a) in view of Rubin?

VII. GROUPING OF CLAIMS

Claims 1-2, 7-8, 10-14, and 17 stand or fall together.

Claims 3-5 and 15-16 stand or fall together.

Claims 6, 9, and 18-20 stand or fall together.

VIII. ARGUMENT

Claims 1-2, 7-8, 10-14, and 17 are patentably distinct from claims 3-5, 6-9, 15-16, and 18-20, because the former group of claims addresses the general caching strategy presented in the Applicant's specification, independent of the source of the information being cached, and independent of the specific criteria used to effect a cache assignment in accordance with this invention.

Claims 3-5 and 15-16 are patentably distinct from claims 1-2, 7-8, 10-14, and 17, based on the remarks above, and are patentably distinct from claims 6, 9, and 18-20 because the former claims address techniques for determining the semantic type that is used to effect the cache assignment, whereas the latter claims address the source of the information that is being cached.

Claims 6, 9, and 18-20 are patentably distinct from claims 1-5, 7-8 and 10-17 based on the remarks above.

Are claims 1-2, 6-14, and 17-20 patentable under 35 U.S.C. 102(a) in view of the Applicant's admitted prior art?

In the Applicant's admitted prior art, conventional techniques for estimating the volatility of information are discussed, and the conventional technique of retaining information in cache based on the estimated volatility is presented. In the example given,

a conventional cache system may employ a different cache strategy for images on a web-site than for text on a web-site, based on different estimated rates of change (volatility) of image information and text information.

In the Applicant's invention, different cache strategies are used for information of different semantic-types. The Examiner notes that "semantic type" broadly refers to a group or category of thing having similar meaning. The Examiner maintains that this broad definition can be interpreted as "data type", and includes the partitioning of information into text and image data. The Examiner asserts that ***all images*** can be grouped together because they ***have the same meaning***, and ***all text data*** can be grouped together because they ***have similar meaning*** (Advisory Action, 12 July 2002, page 2, lines 4-6). The Applicant respectfully maintains that this assertion is contrary to the plain meaning of the word "meaning". Text data that refers to a news article does not have the same "meaning" as text data contained in a telephone directory; images of a weather report do not have the same "meaning" as images in a patent application. On the other hand, weather reports, regardless of whether they contain text, graphics, images, or other data-types, can be characterized as having a common semantic type, because they have a common meaning to a user.

The Applicant further notes that the Examiner's definition and assertion regarding the equivalence between semantic-type and data-type is contrary to the explicit definition of semantic-type provided in the Applicant's specification. The Examiner notes that "It is not at all clear ... that semantic type is a well-known term in the art nor that semantic type is necessarily different from data type." (Advisory Action dated 12 July 2002, page 2, last line.)

Because semantic type is not well defined in the art, the Applicant specifically defines the term: "The expression "semantic type" as used within this context refers to ***different connotative meanings*** that the information contents of resources can have, ***as perceived by the user***" (Applicant's page 3, lines 9-10). To illustrate this definition, the Applicant provides examples: "some information content may be ***perceived*** as highly volatile ... other information may be ***perceived*** as rather static" (Applicant's page 3, lines 11-14). The use of the term "may be perceived" makes it clear that it is the user's

perception of the information that defines whether it should be cached in active or static cache, or somewhere in between. The use of the term "may be perceived as..." also makes it clear that the same information "may *not* be perceived as...". To a user who checks her stock portfolio once a week, a list of stock prices would not be ***perceived*** as being highly volatile. The Applicant respectfully notes that a characteristic such as "data-type" is generally regarded as a fixed characteristic, and not subject to a user's perception. A user cannot change an information item's data-type by perceiving it differently, nor can a user change the caching strategy of a conventional data-type caching system by perceiving the volatility of a particular data-type differently from that of the designer of the conventional caching system.

The Examiner asserts that although the Applicant is entitled to be her own lexicographer, the Applicant's definition is repugnant to its clear English language meaning. The Applicant respectfully maintains that the Applicant's definition of "semantic-type" is consistent with the definition of semantics: "the study of relationships between signs and symbols and ***what they represent to their interpreters***" (Webster's II New Riverside University Dictionary, 1984). When a person is said to be "arguing semantics", the common interpretation is that the person is basing the argument on a particular meaning that the person ascribes to a given word or phrase, when alternative meanings are also viable. The Examiner defines semantic-type as things having a common meaning. As explained by Webster: "MEANING is the general term, usable of anything admitting of ***interpretation***" (Webster's New Collegiate Dictionary, 1977). The Applicant respectfully maintains that the definition provided in the Applicant's specification is consistent with its clear English language meaning, and consistent with the Examiner's definition of semantic-type.

Because the Examiner's asserted equivalence of "meaning" and "data-type" is contrary to the accepted definition of the term "meaning", and further because the Examiner's asserted equivalence of "semantic-type" and "data-type" is contrary to the Applicant's explicit definition of the term semantic-type, the Applicant respectfully maintains that the Applicant's claims are patentable under 35 U.S.C. 102(a) in view of the Applicant's admitted prior art.

Are claims 3-5 and 15-16 patentable under 35 U.S.C. 102(a) in view of the Applicant's admitted prior art?

In addition to the remarks above regarding claims 1 and 14, upon which claims 3-5 and 15-16 depend, the Applicant notes that each of these claims, 3-5 and 15-16 specifically recite one or more techniques for determining the semantic-type of a received resource. These techniques include determining the sematic type based on the request from the user, or based on the context of the request, or based on a user's prior request, and so on. As noted above, an information item's data-type is a fixed characteristic of the information item, and is not subject to external influences, such as a user's preference. In like manner, the information item's data type is not subject to how or why the user accesses the information, and thus cannot be considered equivalent to the Applicant's claimed semantic type, which is determined, at least in part, by how or why the user accesses the information, as specifically claimed in the Applicant's claims 3-5 and 15-16.

Because the Applicant's admitted prior art does not include a determination of a semantic type based on the request of the user, the context of the request, the user's prior requests, and so on, as specifically claimed by the Applicant, the Applicant respectfully maintains that claims 3-5 and 15-16 are patentable under 35 U.S.C. 102(a) in view of the Applicant's prior art.

Are claims 1, 2, 7, 8, 10, 12-14, and 17 patentable under 35 U.S.C. 102(e) in view of Rubin?

Rubin teaches a cache system that uses separate cache buffers for different data objects in a database. Each object in the database includes a "binding" attribute that binds the object to a particular cache buffer. (Rubin, column 4, lines 16-23.) Rubin employs a single cache strategy for each of these cache buffers; the purpose of Rubin's use of different cache buffers is to avoid having select objects removed from cache by requests for access to other non-select objects. (Rubin, column 8, lines 40-56.) Rubin does not

address the volatility of information, and does not provide different caches for effecting different tradeoffs between access-speed and data-staleness.

In Rubin's invention, select objects are routed to one or more "named" cache buffers, and all other, non-selected, objects are routed to a common "unnamed" cache buffer. In the example provided by Rubin, employee records are identified as select objects, and a named cache buffer is used to cache accessed employee records. Because this named cache buffer is not used to cache other non-select objects, the likelihood of a prior accessed employee record being in the named cache buffer is increased, thereby increasing the overall speed of accessing employee records.

Rubin does not teach a determination of semantic-type, as specifically claimed by the Applicant. As noted above, in the context of the Applicant's specification, semantic-type refers to a connotative meaning of the information, as perceived by the user. As taught by the Applicant, the semantic-type is defined and/or modified directly by the user, and/or defined and/or modified by a semantic classifier that determines the semantic-type of the information, based, for example, on a history of the user's use of the information. Rubin, on the other hand, discloses a fixed "binding" of particular objects to one or more cache buffers.

Because Rubin does not teach the determination of a semantic-type associated with an information item that is used to effect a particular caching of the information item, as specifically claimed by the Applicant, the Applicant respectfully maintains that claims 1, 2, 7, 8, 10, 12-14, and 17 are patentable under 35 U.S.C. 102(e) in view of Rubin.

Are claims 3-5 and 15-16 patentable under 35 U.S.C. 102(e) in view of Rubin?

In addition to the remarks above regarding claims 1 and 12, upon which each of claims 3-5 and 15-16 depend, the Applicant notes that claims 3-5 and 15-16 specifically recite one or more techniques for determining the semantic-type of a received resource. These techniques include determining the sematic type based on the request from the user, or based on the context of the request, or based on a user's prior request, and so on. As noted above, Rubin's binding of an object to a named cache buffer is a fixed characteristic of the object, and is not subject to external influences, such as a user's

preference. In like manner, the binding of the object to a named cache buffer is not subject to how or why the user accesses the information, and thus cannot be considered equivalent to the Applicant's claimed semantic type, which is determined, at least in part, by how or why the user accesses the information, as specifically claimed in the Applicant's claims 3-5 and 15-16.

Because Rubin does not teach a determination of a semantic type based on the request of the user, the context of the request, the user's prior requests, and so on, as specifically claimed by the Applicant, the Applicant respectfully maintains that claims 3-5 and 15-16 are patentable under 35 U.S.C. 102(a) in view of Rubin.

Are claims 6, 9, 11, and 18-20 patentable under 35 U.S.C. 103(a) in view of Rubin?

In addition to the remarks above regarding claims 1, 7, and 17, upon which claims 6, 9, and 18-20 depend, claims 6, 9, and 18-20 specifically refer to the remote source of the information content being a site on the Internet. As noted above, Rubin teaches a cache structure that facilitates efficient access to objects in a database. As taught by Rubin, each select object is "bound" to a named cache buffer. Rubin's invention is feasible for a conventional database, but wholly infeasible for information that is distributed across the Internet. Applying Rubin's invention to information available on the Internet requires that all the information on the Internet contain a binding attribute that identifies the cache buffer on the user's system to which this information is to be routed. On the other hand, the Applicant teaches a determination of a semantic-type that is associated with each received information item, and subsequently caching the received information item, from whatever source, to a cache that is selected based on the semantic-type.

Because Rubin neither teaches nor suggests a caching system that is suitable for use with information sources that are located on the Internet, the Applicant respectfully maintains that claims 6, 9, and 18-20 are patentable under 35 U.S.C. 103(a) in view of Rubin.

Is claim 11patentable under 35 U.S.C. 103(a) in view of Rubin?

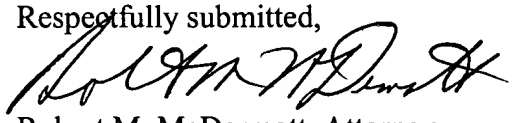
In addition to the remarks above regarding claim 10, upon which claim 11 depends, claim 11 specifically refers to limiting the retrieval of the information from the cache after a given time period. This feature prevents the retrieval of "stale" information from the cache. As noted above, Rubin is silent with regard to the volatility of the information, and does not address time-limits being associated with information in the cache.

Because Rubin neither teaches nor suggests applying a time-limit for information retrieval from a cache, as specifically claimed in claim 11, the Applicant respectfully maintains that claim 11 is patentable under 35 U.S.C. 103(a) in view of Rubin.

CONCLUSIONS

Because neither the Applicant's admitted prior art, nor Rubin, teaches or suggests the use of a semantic-type associated with an information item to determine the caching of the information item, the Applicant respectfully requests that the Examiner's rejection of claims 1-20 be reversed by the Board, and the claims be allowed to pass to issue.

Respectfully submitted,



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On 10 September 2002 By 

APPENDIX

CLAIMS ON APPEAL

1. A method of processing an information resource, the method comprising:

receiving a copy of the information resource from a remote source, and

caching the copy of the information resource in dependence upon a semantic type associated with the information resource.

2. The method of claim 1, wherein

the caching of the copy comprises at least one of: a static caching, an active caching, and a percolating caching.

3. The method of claim 1, further including:

receiving a request from a user, and

determining the semantic type based on the request from the user.

4. The method of claim 3, wherein

the determining of the semantic type includes at least one of:

determining a context of the request,

determining a prior request from the user,

determining a profile of the user, and

determining a response from the user to a result of a prior request.

5. The method of claim 1, further including:

determining the semantic type based on an information content of the resource.

6. The method of claim 1, wherein

the remote source comprises an Internet site.

7. A method of enabling interaction with an information resource, the method comprising:

enabling receiving a copy of the information from the information resource, and

enabling caching the copy according to a caching strategy dependent on a semantic type of the information.

8. The method of claim 7, wherein:

the enabling of the caching comprises supplying an indication representative of the semantic type.

9. The method of claim 7, wherein the information resource comprises an Internet Web site.

10. A method of processing an information resource copy contained in a cache, comprising:

determining at least one parameter associated with a semantic type of the resource copy, and

processing the resource copy in dependence upon the at least one parameter associated with the semantic type of the resource copy.

11. The method of claim 10, wherein

the at least one parameter associated with the semantic type of the resource copy comprises a threshold for a time duration, and

the method further comprises:

precluding the retrieval of the resource copy if the time duration of the resource exceeds the threshold.

12. An information processing system comprising:

a processor that receives a request from a user for an information resource,

a retriever, operably coupled to the processor, that facilitates a reception of a copy of the resource from a remote site, and

a cache system, operably coupled to the request processor, that facilitates a storage and a retrieval of the resource, the cache system comprising:

a cache memory for storing the copy, and

a cache controller operably coupled to the cache memory for control of the storage and retrieval of the copy in the cache memory in dependence upon a semantic type of the resource.

13. The system of claim 12, wherein

the cache memory comprises a plurality of cache sections, and

the cache controller selectively accesses a specific one of the cache sections in dependence upon the semantic type of the resource.

14. The system of claim 12, further including

a semantic classifier, operably coupled to the request processor, that determines the semantic type of the resource.

15. The system of claim 14, wherein

the semantic classifier determines the semantic type based on at least one of: a context of the user, a prior request of the user, a profile of the user, and a response from the user to a result of a previous request from the user.

16. The system of claim 14, wherein

the semantic classifier determines the semantic type of the resource based on a material content of the resource.

17. A database comprising:

a plurality of indexes corresponding to a plurality of information resources, and

a plurality of default semantic types corresponding to the plurality of information resources that facilitates a caching of each information resource of the plurality of information resources based on the default semantic type of each information resource.

18. The database of claim 17, wherein the plurality of information resources includes an Internet Web site.

19. The database of claim 17, wherein the plurality of information resources includes resources that are available via an Internet service provider.

20. A Web page comprising:

an information resource, and

an identification of a semantic type associated with the information resource.

for controlling an automatic processing of the web page.